

PATENT SPECIFICATION

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DRAWINGS ATTACHED

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(54) IMPROVEMENTS RELATING TO CONTAINER MANUFACTURE AND FILLING

(71) We, ROBERT BOSCH G.m.b.H., a German Company, of 4, Breitscheidstrasse, Stuttgart W, Germany, do hereby declare the invention, for which we pray that a patent 5 may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to an apparatus for manufacturing, filling, and sealing containers made from thermoplastic synthetic material, comprising a blow-moulding device, a filling device, and a sealing device.

In an apparatus of this kind, known for example from the Swiss Patent Specification No. 388,173, a blow mould is fixedly arranged below an extrusion head. A mandrel extends into the tubular piece inserted 10 by the extrusion head into the blow mould and has a blast nozzle and a filling nozzle which first of all inflate the tubular piece in the blow mould to form a bottle and then fill the latter. The bottle is sealed whilst it 15 is still in the blow mould, the neck of the bottle being compressed or a closure cap being mounted in the neck of the bottle. The delivery output of such apparatus is relatively low, since the containers are successively formed, filled and sealed at the same station.

A feature of the present invention is to provide an apparatus by which containers of plastics material can be formed, filled and sealed at a high rate of delivery output and which is of simple and accessible construction.

In accordance with the present invention, the blow mould and the filling and sealing devices are arranged at stations along a stepwise actuated conveyor device, and the conveyor device carries grippers which grip pre-formed blanks of plastics material at their upper ends, and continuously hold the blanks whilst they are being deformed to form containers and continuously hold the finished containers until after the latter have been filled and sealed.

[Price 25p]



Thus a high delivery output can be obtained by using a single mould. Due to the fact that the pre-formed blanks and the containers made therefrom are continuously held at one point during conveying and processing, difficulties which occur when the containers have to be freshly gripped each time they are fed from one processing device to another can be overcome.

In a particularly advantageous and simple embodiment of the invention, one jaw of each holding gripper is rigidly arranged on the conveyor device and the other jaw is arranged on the conveyor device so as to be movable towards the fixed jaw.

The invention will be further described by way of example, with reference to the accompanying drawings, in which;

Fig. 1 is a simplified side view of an apparatus for manufacturing, filling and sealing containers made from plastics material; and

Fig. 2 is a plan view of a portion of the conveyor device of the apparatus illustrated in Fig. 1.

By means of the illustrated apparatus thimble-shaped pre-formed blanks 1 of thermoplastic synthetic material having a radially outwardly projecting flange 2 in the region of their mouths are first of all heated. For this purpose, the pre-formed blanks with their mouths directed downwardly are placed onto seats 12, which are arranged on a conveyor device 11 and through which hot air or super-heated steam, fed through a line 13, is blown into the interior of the pre-formed blanks 1. A clamping holder or fork 14 of a transfer device (not shown) grips the flange 2 (maintained in a cool state) of a pre-formed blank 1 heated to the required deformation temperature and carries the pre-formed blank 1 to a second conveyor device such as a conveyor wheel 15 (Fig. 2) which is rotated in a stepwise manner in a horizontal plane.

For the purpose of holding the pre-formed blanks 1 or the containers such as bottles 3 formed therefrom, the conveyor wheel 15 is provided with uniformly spaced, readily

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projecting grippers each having a fixed jaw 16 and a jaw 17 pivotable towards the fixed jaw. The grippers of the conveyor wheel 15 are moved successively into a transfer station 4, a forming station 5, a flushing station 6, a filling station 7, a sealing station 8, and a discharge station 9.

When a pre-formed blank 1 has been placed into one of the grippers formed by the jaws 16, 17 at the transfer station 4 the pre-formed blank is advanced to the forming station 5. Here, a split blow mould 18 is arranged below the plane of the jaws 16, 17 and closes upon the pre-formed blank 1 suspended in the jaws 16, 17. A blow head 19 is arranged above the jaws 16, 17 at the forming station 5 and can be lowered onto the flange 2 of the pre-formed blank 1. A line 20 containing a valve 21 opens into the blow head 19 for the purpose of supplying an air blast. Furthermore, a stretching plunger 22 is guided in the blow head 19 so as to be movable up and down.

After a heated pre-formed blank has been conveyed to the transfer station 4 and then to the forming station 5, the blow mould 18 is closed upon the pre-formed blank 1 and the blow head 19 is placed onto the flange 2 thereof. The stretching plunger 22 then moves downwardly and abuts against the bottom of the pre-formed blank 1 to stretch the pre-formed blank 1. Simultaneously a pressurised air blast is admitted into the pre-formed blank 1 by way of the valve 21 and the line 20, so that the pre-formed blank is stretched until its wall abuts against the interior wall of the blow mould 18. The flange 2 of the pre-formed blank 1 is not deformed but retains its original shape for the bottle 3.

When the blow head 19 and the parts of the blow mould 18 have been removed from the bottle 3 so manufactured, the jaws 16, 17 convey the bottle 3 into the flushing station 6 at which a flushing head 23 is lowered onto the flange 2 of the container 3 temporarily sealing it. A tube 24 extends through the flushing head 23 and is connected to a source of flushing gas by way of a line 25 and a valve 26. A line 27 leads out of the flushing head 23 to a pressure testing device 28 and to a valve 29 which opens into the atmosphere. The valve 26 is opened when the flushing head 23 is placed tightly onto the flange 2 of the previously formed bottle 3, so that flushing gas flows into the bottle 3 through the tube 24 which extends almost to the bottom of the bottle 3. The flushing gas escapes through the line 27 and the valve 29 which is also open. After the flushing operation, the valve 29 is closed to test the bottle for tightness, and the pressure occurring is measured by means of the pressure testing device 28. The bottle 3 is removed if the pressure testing

device 28 does not ascertain a specific level of pressure.

The bottle 3 held by the jaws 16, 17 is filled through a filling tube 30 which enters the bottle at the filling station 7. At the sealing station 8 a sealing stamp 31 places a lid 32 onto the flange 2 of the container 3 and welds the lid to the flange 2 by means of pressure and heat, the jaws 16, 17 serving as a counter-holder. At the delivery station 9, the gripper is opened so that a conveyor belt 45 can remove the finished container from the apparatus.

Each of the jaws 16, 17 has a semi-circular recess 33, 34 for gripping and carrying the pre-formed blanks 1. The recesses 33, 34 of each gripper complement each other to form a circular opening whose radius corresponds to the radius of the pre-formed blanks in the region near to the flange 2. The pre-formed blanks 1 transferred by the fork 14 to the grippers at the transfer station 4 are located with their flanges 2 on the edge region of the recesses 33, 34 in the jaws 16, 17, and the bodies of the pre-formed blanks pass through the recesses. Furthermore, the jaws 16, 17 form a part of the blow mould when the bottles 3 are being formed from the pre-formed blanks 1, i.e. the jaws 16, 17 form the part of the blow mould which determines the neck portion of the finished bottles. Thus, the jaws 16, 17 hold the pre-formed blanks 1 and the bottles 3 formed therefrom until the filled packages have been finished.

In the described embodiment, the fixed jaw 16 is arranged so as to be located forwardly in the direction of rotation of the conveyor wheel 15, and the pivotable jaw 17 is hinged to the conveyor wheel by a bolt 36. Whilst pre-formed blanks 1 and bottles 3 are being conveyed, a tension spring 39 attached to pins 37, 38 on the jaws 16, 17 pulls the pivotable jaw 17 towards the fixed jaw 16. The pins 37, 38 are arranged on the jaws 16, 17 in such a manner that when the jaw 17 is pivoted away from the jaw 16, the longitudinal axis of the tension spring 39 is moved in a plane substantially transversely of the axis of rotation of the bolt 36, intersects the axis of rotation of the bolt, and is moved therebeyond so that the pivotable jaw 17 is held in the open position.

A rotating finger 40 having a roller 41 is arranged at the discharge station 9 for the purpose of pivoting the jaw 17 away from the fixed jaw 16. The roller 41 acts upon a projecting lug 42 on the jaw 17 and pivots the latter away from the fixed jaw 16. A rotating finger 43 provided with a roller 44 pivots the projecting jaw 17 back towards the jaw 16 at the transfer station 4.

The grippers for holding the pre-formed blanks 1 and the containers 3 can also be

arranged on a conveyor device extending in a straight line.

WHAT WE CLAIM IS:—

1. Apparatus for manufacturing, filling, and sealing containers made from thermoplastic synthetic material, comprising a blow-moulding device, a filling device, and a sealing device arranged at respective stations along a stepwise actuatable conveyor device, the conveyor device having grippers thereon for gripping pre-formed blanks of plastics material at their upper ends and continuously holding the blanks whilst they are being deformed to form containers and continuously holding the finished containers until after they have been filled and sealed.
- 10 2. Apparatus as claimed in claim 1, in which one jaw of each gripper is fixedly arranged on the conveyor device and the other jaw is arranged on the conveyor device so as to be movable towards the fixed jaw.
- 15 20

3. Apparatus as claimed in claim 2, in which the movable jaw of each gripper is arranged behind the fixed jaw in the conveying direction of the conveyor device.

4. Apparatus as claimed in claim 3 in which the movable jaw of each gripper is pivotable about a hinge, and that one end of a spring is attached to the movable jaw, the longitudinal axis of the spring being moved in a plane transversely across the axis of rotation of the said jaw each time the latter is opened and closed.

5. Apparatus for manufacturing, filling, and sealing containers constructed and arranged substantially as herein described with reference to and as illustrated in the accompanying drawings.

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COMPLETE SPECIFICATION

1 SHEET

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